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Using Old Oyster Shells As Substrate For Juveniles, UNH Oyster Restoration Efforts Come Full Circle

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NH Sea Grant

August 30, 2007

DOVER, N.H. – Ray Grizzle wades slowly in the shallow waters at the mouth of the Bellamy River, inspecting the river bottom and finding some shells. “2006 was a good year, maybe the best ever,” he says thoughtfully, in much the same manner a wine connoisseur would talk about a fine vintage red. Instead, Grizzle is speaking about the 2006 “spat,” or young oysters, around the Great Bay Estuary, one that added numerous juvenile oysters to the depleted population.

Grizzle, University of New Hampshire research professor of zoology, and research technician Krystin Ward have spent the morning loading up a boat with bins containing oyster shells dotted with one million oyster spat, each no larger than a grain of sand. After a short trip out to the Bellamy at low tide, Grizzle stops the boat and they begin gently tossing the shells into the water near tall PVC pipes marking the location of their continued oyster reef restoration efforts.

“People ask, ‘why oysters? What’s the big deal?’” Grizzle says. “Well, some consider them to be a keystone species: they filter the water column for their food, they provide habitat and food for other species, including humans, and in northern estuaries, they are a unique species, one that’s important ecologically.”

The concept of oyster reef restoration isn’t new, but in Great Bay some changes have taken place to make this particular one unique. In previous years, the oysters were raised for a few months at UNH’s Jackson Estuarine Laboratory (JEL) prior to their release into the restoration locations. This made the job more difficult and time consuming, as the baby oysters were required to grow in size, making the bins heavier. In addition, they would often attach themselves to one another or to the sides of the bins. When the shells were separated to place individuals in the restoration site, it was a call to action for the species that feed on oysters.

“The sound made by the shells when we broke them apart was like ringing the dinner bell for oyster predators,” says Jenn Greene, lab supervisor. “You would see this army of mud snails moving across the mud flat, just swarming around the oysters. Some oysters will be consumed, that’s just a fact of life out there.” Although the mud snails are not usually considered predators, they do feed on dead and dying oysters.

Placing the juvenile oysters in the restoration site when they are mere specks on a shell could prove to be a quicker and more cost-effective method of restoration if the set is successful. In addition, Grizzle explains that oyster spat of that size (less than one millimeter) won’t have

the scent associated with them that larger, broken oysters do and therefore may not attract as many predators, thus allowing survival to reproductive age.

"Since we started the restoration program in 1999, it has really evolved," Grizzle says. "One of the major conclusions we have drawn is that we need more hard substrate for baby oysters to grow, and the best substrate is old oyster shells."

But the bigger story, at least for those working at Grizzle's lab, is where those old oyster shells have originated.

"Oysters are harvested from the bay, eaten, and the shells are thrown into the landfill," Grizzle says. "That's not the natural cycle. We wanted to complete the cycle that this species should be going through naturally by putting shells back into the estuary." So with the help of Greene, the UNH Oyster Shell Recycling Program was developed in 2006.

The Bellamy River restoration site that Grizzle and Ward are working on is the completion of that cycle, thanks to this recycling program. All the shells they are placing in the Bellamy are from Great Bay and have been donated by the public, including recreational oyster harvesters. A trailer located near JEL allows locals to drop off their used shells into separate large plastic bins for use in the recycling and restoration efforts.

The idea behind a shell recycling program is similar in nature to those in southern states, including South Carolina, but on a much smaller scale. Grizzle approached Ken La Valley, extension agent for NH Sea Grant, for help in writing a grant to get the program started locally.

"This project is an ideal example of community helping science," La Valley says. "They had a need for shell to enhance their restoration efforts, as well as the funding necessary to devote their time. We paired them up with Cooperative Extension and NH Sea Grant to get money, and we came up with a way to make it work."

Getting the program off the ground also required the development of a hazardous analysis and critical control point (HACCP) plan. La Valley explains that these plans are normally used in the seafood, restaurant and processing industries as a preventative program that identifies potential hazards in a manufacturing process of food handling situations. These hazards often include pathogens that put consumers at risk. In the case of the shell recycling program, developing a HACCP plan allowed researchers and managers to minimize the risk of bringing pathogens or exotic species into the bay.

Along with UNH, the NH Fish and Game Department encourages the public to return oyster shells once they've eaten the meat. Bruce Smith, marine biologist with the NH Fish and Game Department's Marine Fisheries Division, says that they sell between 400-600 oyster harvesting licenses per year, and each license holder is sent a letter recommending they return the shells once they've eaten the meat.

The Department is in charge of keeping track of and setting the harvesting regulations, such as the number of oysters harvested and tools used. Although recreational harvest is allowed in certain locations, other oyster beds are not open for such activity due to pollution loads from nearby wastewater treatment facilities, Smith explains. A portion of the Bellamy River oyster reef restoration project is one of those locations, thus providing a sanctuary for a possible rebound in the oyster population.

Although the oyster reef restoration efforts have resulted in both successes and failures over the years, the shell recycling program has added a positive component to the overall project goals.

"I believe we're beginning to see a change in something that will become important ecologically and societally," Grizzle says. "I see some glimmer of hope for the oysters coming back in the estuary."

For more information about this research, contact Jenn Greene at 603-862-1244.

Photographs available to download:

<http://unh.edu/news/img/oyster/boatride.pdf>

Caption: University of New Hampshire research professor of zoology Ray Grizzle and research technician Krystin Ward take Great Bay oyster shells dotted with 1 million oyster "spat" or young larvae out to the mouth of the Bellamy River as part of an ongoing oyster reef restoration project. Credit: Rebecca Zeiber.

<http://unh.edu/news/img/oyster/laboysters.pdf>

Caption: Lab supervisor Jenn Greene holds a Great Bay oyster shell that is being used as the substrate for tiny oyster "spat" to grow on for the UNH oyster shell recycling program and oyster reef restoration efforts in the bay. Credit: Rebecca Zeiber.

<http://unh.edu/news/img/oyster/reefrestoration.pdf>

Caption: Research technician Krystin Ward gently tosses oyster shells holding tiny oyster "spat" into the mouth of the Bellamy River as part of an ongoing oyster reef restoration project. Credit: Rebecca Zeiber.

<http://unh.edu/news/img/oyster/spat.pdf>

Caption: Close-up of the oyster "spat" on shells being placed in the Bellamy River oyster reef. They are about the size of a grain of sand, and approximately 1 million were placed in the reef for ongoing reef restoration efforts by UNH. Credit: Rebecca Zeiber.

